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FOR MANAGEMENT IN ELECTRONICS, COMPUTER & SYSTEMS COMPANIES — WORLDWIDE

AUGUST 1, 1988

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RISC plus Unix equals HP's Spectrum PAGE 46

William Conlin
president of
CalComp

Electronic Business

FOR MANAGEMENT IN ELECTRONICS, COMPUTER AND SYSTEMS COMPANIES—WORLDWIDE

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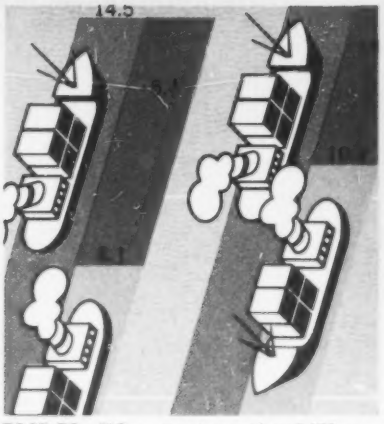

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ELECTRONIC BUSINESS articles are available on a custom printing basis at reasonable prices. Contact Joanne Westphal, Cahners Reprint Service, Cahners Plaza, 1350 E. Touhy Ave., PO. Box 5080, Des Plaines, Ill. 60018 (312) 635-8800
Total Circulation: 76,550

Made in America

Ostensibly, the cover story of this edition is about CalComp, the plotter and digitizer division of Lockheed Corp., which claims to be in the forefront of just-in-time, statistical quality control and other advanced manufacturing techniques. We'd like to think, though, that there's more to this article than just a simple corporate profile. The story of CalComp is really the tale of how one American company has rejuvenated its revenue and profits in a price-sensitive market through a solid top-down commitment to manufacturing at home.

Faced with a tough choice between the United States and Singapore, Bill Conlin, CalComp's president, chose the United States as his manufacturing base. And so far, he has no apparent reason to regret that decision. Associate editor Bruce Rayner talked to Conlin and a half-dozen other executives at CalComp to get the story. We think it makes fascinating reading.

Beth Karlin and George Koopman, president of Amroc

More on manufacturing

In addition to our profile of CalComp, we're also taking a look at manufacturing in the auto industry. In this third article in a series on automotive electronics, contributing editor Norm Alster talks to Honda, Nissan and other Japanese car firms that have set up manufacturing plants in the United States.

Do these Japanese transplants plan on buying more of their electronic subsystems from U.S. companies now that they're incorporated in America? Not necessarily, experts say. The carmakers will source metal stampings and other less sophisticated parts in the United States, but the electronics side of the business still belongs largely to Japanese subcontractors. As Robert Drave, Nissan's vice president for engineering and purchasing, points out: "We find in most cases that the Japanese quality is better."

Born to move

We'd also like to call your attention to Beth Karlin's overview of the space electronics market in our "Business Trends" section. To complete her assignment, Beth traveled to Edwards Air Force Base in the middle of California's Mojave Desert to interview George Koopman, president of American Rocket.

Incidentally, Beth, who has worked for us for several years — first in London and then in Washington, D.C. — recently moved to Boston to join us as assistant managing editor. In her new position, Beth will oversee ELECTRONIC BUSINESS magazine's far-reaching network of contributing editors in the United States and Europe. Welcome aboard, Beth.

AL FURST, editor

ELECTRONIC BUSINESS® (ISSN 0163-6197) is published semi-monthly, except monthly in December, by The Cahners Publishing Company, A Division of Reed Publishing USA, 275 Washington Street, Newton, MA 02158-1630. Terrence M. McDermott, President; Frank Sibley, Group Vice President; Jerry D. Neth, Vice President/Publishing Operations; J.J. Walsh, Financial Vice President/Magazine Division; Thomas J. Dellamaria, Vice President/Production and Manufacturing. Circulation records are maintained at Cahners Publishing Company, 44 Cook Street, Denver, CO 80206-5800. Telephone: (303)388-4511. Second-class postage paid at Denver, CO 80206-5800 and additional mailing offices. POSTMASTER: Send address corrections to ELECTRONIC BUSINESS® at the Denver address. ELECTRONIC BUSINESS® copyright 1988 by Reed Publishing USA; Saul Goldweitz, Chairman; Ronald G. Segel, President/C.E.O.; Robert L. Krakoff, Executive Vice President; William M. Platt, Senior Vice President. Annual subscription rates for non-qualified people: USA/Canada/Mexico, $55 per year; other countries, $85 per year (including air freight), $170 per year for air mail. Except for special issues where price changes are indicated, single copies of regular issues are available for $6.00, $8.00 and $10.00 (USA, Canada/Mexico and foreign). Please address all subscription mail to Eric Schmierer, 44 Cook Street, Denver, CO 80206-5800. Cahners Publishing Company, A Division of Reed Publishing USA • Specialized Business Magazines for Building & Construction • Manufacturing • Foodservice & Lodging • Electronics & Computers • Interior Design • Printing • Publishing • Industrial Research & Technology • Health Care • Entertainment. Specialized Consumer Magazines: American Baby • Modern Bride.

BPA ABP

Think OSI — not just MAP

I read with interest your article on MAP in the May 1 issue. The coverage of MAP was good and timely but I believe there are some broader issues concerning the general Open Systems Interconnection (OSI) marketplace (which includes MAP and TOP) which would interest your readers. Those issues are: the Japanese response to OSI; the large vendor/small vendor conflict over standards; and the availability of OSI in silicon.

TONY HELIES
President
Concord Communications
Marlboro, Mass.

Editor's note: We plan to cover broader OSI perspectives in coming issues.

Carl Icahn, we need you

Your May 1, 1988 issue's cover story on Sematech was great, but it seems to miss the point and makes quite a few invalid assumptions.

Sematech is a $250 million boondoggle, half paid directly from government funds and the balance from corporate tax write-offs. Its purpose is to give a much needed boost to the Texas economy and to lock the Defense Department into dealing exclusively with American electronics manufacturers, thereby heading off DOD's recent forays into increased foreign purchases.

It is very doubtful that any big corporate or government bureaucracy can ever be innovative. Certainly, the 14 Sematech members have been about as innovative in the past 10 years as a bunch of angleworms. The simple fact is that the Japanese have become competitive by taking American technology and by investing in larger wafers, while these American dodos have sat, fat and happy on their hands, with smaller wafers and 64K and 256K DRAM products.

The "chip" industry has gotten into its current mess for the same reasons that put our once-great automobile industry into the morgue. Overpaid executives have been taking money under false pretenses, adding nothing but "cost" and "overhead" to their employer company's operation. At the same time, they have been cutting their future life's blood: R&D maintenance and capital expenditures for equipment and innovative products. "Three years, up or out" has been their motto.

Their love affair with counterproductive "offshore" vacations and its production rationalization has exacerbated the problem. Now, like the auto industry, these high-priced "bean counters" are turning to the American taxpayer to bail them out of their self-created mess. We, the American worker and taxpayer, will, of course, pick up the tab. Sematech will end up being the OPEC of the semiconductor business — another price-fixing cartel: zapping the American consumer and economy again. Carl Icahn and T. Boon Pickens, where are you when the electronics business and your country need you?

DANIEL B. McDEVITT
President
Research and Development
Institute of the U.S.
Tulsa, Okla.

Our side of the story

Your article, "Chip-making software: Still waiting for the big time" [May 15, 1988 p104] disturbs me because of inaccuracies about our company and its bias toward our primary competitor. We (Promis Systems Corp.), for example, are based in Toronto, not California. Furthermore, the story incorrectly gives the impression that Consilium's customer base is triple that of Promis and that we are out of step with the industry. That impression is clearly inaccurate.

We were not given the opportunity to verify data about the industry and our company, or be quoted in the story. That courtesy, however, was extended to our competitor.

DOUGLAS H. MEALY
Manager, Marketing Communications
Promis Systems Corp.
Santa Clara, Calif.

Corrections

I believe that you inadvertantly left our company, Data Switch Corporation, off your May 1, 1988, list of "1987's Fastest Growing Companies." We have grown from $18.183 million in revenue in 1982 to $96.886 million in 1987 (fiscal year ended Dec. 31, 1987). This growth is approximately 39.7% compounded per year . . . all in the electronics business. This would place us at number 35 on your list and third on your "Communications" segment behind DCA and Regency Electronics.

ROBERT G. GILBERTSON
President and CEO
Data Switch Corp.
Shelton, Conn.

In the July 15 issue's list of the top 200 electronics companies, Convergent Inc. [formerly Convergent Technologies Inc.] was omitted. Convergent, with 1987 sales of $384.8 million would have placed 98th on the list.

Also, the following companies were mistakenly omitted from our May 15 venture capital directory:

Accel Partners
1 Palmer Square,
Princeton, N.J. 08542
James Swartz (609) 683-4500

Adler & Company
375 Park Avenue, Suite 3303,
New York, N.Y. 10152
Frederick R. Adler, Yuval Binur:
(212) 759-2800

Hambrecht & Quist Venture Partners
235 Montgomery Street,
San Francisco, Calif. 94104
Bob Kunze: (415) 576-3300

Sevin Rosen Management Co.
200 Park Avenue,
New York, N.Y. 10166
Benjamin Rosen: (212) 687-5115

Modem makers adapt to ISDN

ISDN has the potential to wipe modem makers off the map. But terminal adaptors could help keep them alive

Like beach dwellers in hurricane season, modem makers are enjoying days of relative calm while they can. At the same time, they've got a nervous eye on the horizon, waiting for the day when integrated systems digital network (ISDN) finally roars ashore in all its advertised glory.

Modem sales are predicted to grow from 2.6 million units in 1987 to nearly 4.7 million units in 1992, according to researchers at Frost and Sullivan Inc. in New York City. But analysts are reluctant to forecast the modem market much beyond that date largely because of the uncertain impact of ISDN.

The all-digital network, which promises simultaneous transmission of voice, data and video signals, could theoretically wipe modem companies off the map when it arrives in force. How soon it will take hold in the United States is a matter of debate.

During the next two decades, most observers agree, ISDN will gradually replace the existing analog network and eliminate the need for modems, which translate computer language into something analog networks can understand.

So what are modem makers doing about all of this? For many, a life raft for surviving the ISDN flood may take the form of terminal adaptors (TAs). These devices are seen as the bridge between the vast installed base of existing computers and the new network.

Hayes Microcomputer Products Inc., the Norcross, Ga., company that claims the leading market share in personal computer modems, has developed a TA in the form of a board that can be inserted in PC expansion slots. Although Hayes has not released pricing and commercial availability information about its TA, prototype models have been used in exhibits at last fall's Telecom '87 in Geneva and in Southern Bell Co.'s rollout of ISDN technology in Atlanta this spring.

"I don't think analog use will peak for at least five years," says Dennis Hayes, who founded the $200 million-plus, privately held modem company in 1977. "But there's no question that ISDN is going to have a major impact on the country and our company. We want to be as ready for that impact as we can be."

The tough decision confronting Hayes is how much money to put into research and production of TAs at the expense of other products, when demand for ISDN is hard to gauge.

Hayes, observes Walth Sessoms, Southern Bell's vice president for Georgia, "has got to decide whether they're in the buggy whip business or the starter business."

Another potential manufacturer of TAs is Racal-Milgo, the modem maker based in Sunrise, Fla. It has developed prototypes in the form of a standalone box roughly the size of a modem itself. In January, the company began testing TA devices called Integrated Service Units in a trial with a Northern Telecom Inc. DMS 100 switch under the auspices of Bell Canada.

Like Hayes, Racal-Milgo, which garnered about $300 million in revenue last year, is faced with making a transition from a modem company to an ISDN-age communications firm.

As North American consumers begin sizing up ISDN, TAs will fill an expanding niche, says Robert Montgomery, Bell Canada's director for marketing.

"I don't think analog use will peak for at least five years"
Dennis Hayes, Hayes Microcomputer

"While ISDN-based services will be developed with the new ISDN terminals, it is absolutely essential that the large base of currently installed customer equipment also be compatible with the new ISDN services and terminals," Montgomery said when announcing the Racal-Milgo trial. "Terminal adaptors are the recognized method of achieving this."

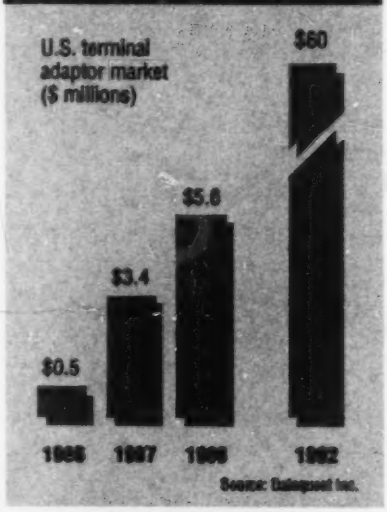
ISDN, however, will be a slow-moving hurricane at best, concludes Wiley Ehrke, ISDN product manager for Dracon, a division of Harris Corp. of Melbourne, Fla.

"Considering the fact that standards are still evolving, modems and TAs will probably coexist for a long time," Ehrke says. Harris is developing four different types of standalone TAs ranging in price from $1,200 to $1,600, he says.

Ultimately, TAs are seen as a transition product until computer manufacturers begin building telecommunications interfaces into most of their terminals. Victor Kreuguer, an analyst with Dataquest Inc. of San Jose, says he expects the TA market to be significant until at least 1995 to 2000.

After that, TA manufacturers may be in the same boat that modem makers are in today. □

Terminal adaptors: The bridge from modems to ISDN



TAs are seen as a transition product until computer manufacturers begin building telecommunications interfaces into most of their terminals.

The Lockheed subsidiary is a textbook example of how one U.S. company turned around its fortunes through manufacturing in the United States

Made in America

CalComp plots a world-class future

BY BRUCE C.P. RAYNER

When ex-Burroughs Corp. executive William Conlin came on board as president of graphics peripherals products maker CalComp Inc. in 1983, he inherited a company in trouble. Competition from the likes of Hewlett-Packard Co. was eating CalComp's lunch and company morale was in the doldrums. The talk at the top centered around which Far East country would be the best place to relocate manufacturing.

Five years later, and with capital investments of just $800,000 in the past three years, the $400 million maker of plotters, digitizers and display terminals has emerged as a sleek competitor. The Lockheed Corp. subsidiary now boasts improved market share, together with rising revenue, sustained profitability and a United States-based manufacturing thrust in a market characterized by intense price sensitivity.

The firm has done it largely through advanced manufacturing techniques, backed by clear-sighted marketing tactics. CalComp's apparent success in the peripherals market suggests there may be hope for other U.S. manufacturers who would rather invest domestically than emigrate to cheap labor markets in the Far East.

The man that Hewlett-Packard execs love to hate: CalComp boss Bill Conlin

David Bradley

Psychology has had a lot to do with the turnaround too. "I felt it was important to set about making an attitudinal change," says Conlin. "We had the ability to be the best, and we started pushing that idea to get people feeling good about themselves." Even though Lockheed does not break out CalComp's numbers, analysts say that since taking the reins, Conlin has doubled company revenue from $196.3 million for fiscal 1983 to an estimated $400 million this year.

Stable margins

More to the point, CalComp has kept its pretax profit margins more or less stable at around 10%, estimates Lawrence Harris, a senior analyst at investment brokerage Bateman Eichler, Hill Richards Inc., in Los Angeles. In a business where unit price is continuously dropping and sales channels are in upheaval, stable margins are a major accomplishment. Since 1983, price erosion has averaged between 10% and 20% per year on most company products, sources say.

Conlin attacked the corporate malaise on a number of fronts, but the two areas that needed the most attention were marketing and manufacturing. His intention was to transform CalComp into a market-driven company both in terms of sales focus and in terms of new products. As a matter of survival, he redirected the company away from its engineering focus so that by mid-1987, the company was completely restructured around the sales and marketing function.

A total of 25 vice presidents has been whittled down to 11, six of whom report directly to Conlin. One is Larry Sanders, an IBM alumnus who is CalComp's sales and marketing chief. Sanders has been the architect of the focus toward PC-oriented products, and for the consequent pressure on price-performance ratios. For example, he initiated the 38% price cuts on CalComp's 5800 series electrostatic plotters in the second

quarter of 1987 — an action that the company claims resulted in a doubling of revenue for that product line inside six months. "CalComp didn't turn things around until they created the new marketing approach, when they focused things around Sanders," comments Randall Stickrod, publisher of *The Stickrod File*, a graphics-industry newsletter based in San Francisco.

Relearning the basics

At the same time, Conlin began the laborious task of changing the corporate mindset toward manufacturing. After Conlin made it clear where he wanted to go, the initial step was to relearn the basics of manufacturing, says David Schlotterbeck, vice president and general manager of the plotter division. Despite CalComp's 25 years of manufacturing, "the facts were that we knew as little about [manufacturing] as most every other American company," he says.

Old attitudes began to change just as fast as the personnel. This was true for all three of the company's divisions: a digitizer operation in Scottsdale, Ariz.; a unit to manufacture graphics control devices in Hudson, N.H.; and a plotters group at the Anaheim, Calif., headquarters.

Three new general managers and vice presidents — including Schlotterbeck — were hired to oversee production, and by mid-1986 they had brought on board or promoted three new directors of operations. These were the new lieutenants whose responsibility it would be to implement just-in-time (JIT) manufacturing. The goal was to make all three factories world-class, meaning they were to become competitive in terms of price and quality with any manufacturer in the world.

JIT, in textbook terms, means streamlining production so that material arrives on the factory floor just in time for production. The goal is to have 100% quality parts arrive from suppliers, with no in-line inspection or rework required. For CalComp, textbook JIT was exactly what

Plotter inventory has been cut by 65%, yet plotter revenue has risen 62%

was applied to the problems. Conlin insisted that all employees read Richard J. Schonberger's 1986 book, *World Class Manufacturing, The Lessons of Simplicity Applied*. From vice presidents to factory floor workers, the pragmatic book began to influence the way everyone thought about their jobs.

With the new bible in hand and a mandate from above, the three directors of operations went to work simplifying manufacturing. At the plotter division, for example, operations director John Revere was given an ultimatum: Shape up the factory or it would be shipped to Singapore. So he took a $298,000 investment and turned it into $6.2 million in cost savings within two years. The investment was used for training in statistical process control (SPC) and for construction of office space for support staff right on the factory floor. And he charged the design team of the new 1023 model pen plotter with a 20-20-20 mandate: no supplier can be more than 20 miles from the factory; the number of fasteners used in the unit could not exceed 20; and the number of suppliers likewise. The final results came in at under 30-30-30.

Compared with the 1023's predecessor — the 1040 pen plotter — the improvements were promising: inventory turns were running at over 26 a year by early 1987, compared with 19 for the 1040; direct labor for assembly was down by over 80%; and CalComp sold more 1023s in the first 90 days than it expected to sell in the first year.

For the division as a whole, the results were equally dramatic. Inventory has been reduced by 65%; cycle times improved, production warehousing was eliminated and the number of suppliers has dropped by 40%. At the same time, revenue has risen by 62%, the company claims.

The display division has also been zealous about JIT, but with one twist. A large part of the value added for display products is in stuffing printed circuit boards. As it is highly capital intensive, the division has opted to

CalComp's sales and operating income

*Estimate: Lockheed does not break out CalComp figures

Sources: Company reports; Bateman, Eichler Hill Richards Inc.

Price erosion isn't stopping CalComp from keeping sales soaring — and margins up

David Bradley

"We knew as little about manufacturing as most every other American company," says David Schlotterbeck, general manager of the plotter division

keep the functional factory structure. The board line accounts for nearly half of the total factory, assembling about 4,000 boards a month for all the division's product lines.

Like the other operations chiefs, James Bell, director of operations at the display division, has shunned automation. He removed a sophisticated conveyor system because it was not adding any value and put in its place a horseshoe-shaped production line for circuit board assembly. As a result, board cycle time has dropped from 12 weeks to three weeks and factory space is down by 25%.

The improvement in circuit board assembly at all three divisions is a crucial step toward reducing the reliance on foreign sourcing. For instance, the plotter division is currently ramping up production for JIT-based board stuffing in the display division's facility for one of its newer products. If total cost of board assembly can be reduced for other new products as they come on-line, it is feasible that all board stuffing could return to the United States.

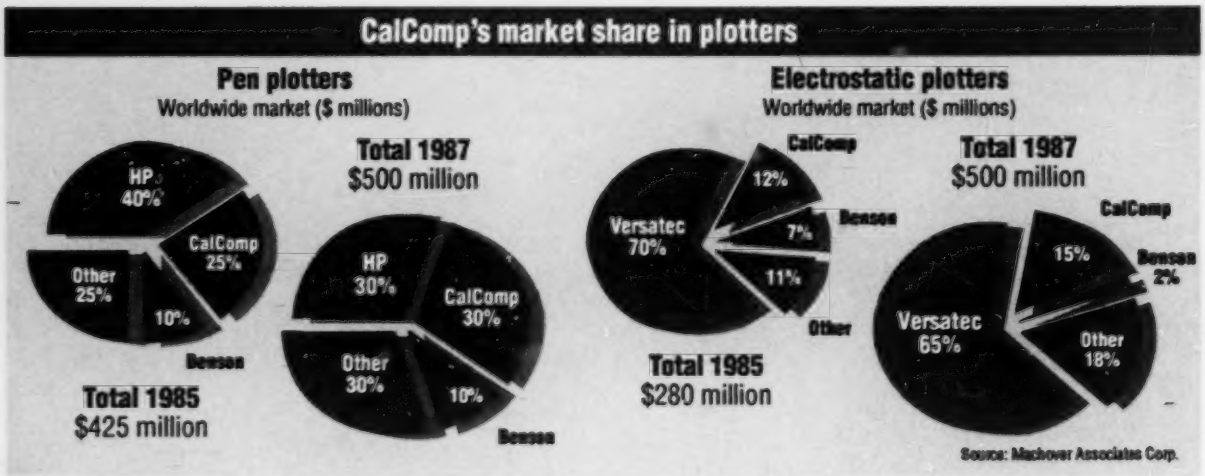
The digitizer division has already brought all its printed circuit board stuffing back in house from Singapore. "With Phoenix labor, we beat the Singapore price," says Gary Long, vice president and general manager of the digitizer facility.

Calcomp is also paying closer attention to its distribution channels. Sales through distributors and value-added resellers such as Entre Computer Centers Inc. have risen from zero five years ago to about 40% of total revenue today, the company reports. And the mix of direct sales to OEM accounts has switched from a 55-45 split to a ratio of 20% direct and 80% alternative channels, reflecting the move to PC-oriented equipment.

IBM's business

Similarly, IBM used to account for a sizable chunk of total business, and that has since dropped to about 25% with expectations of a further decline to 15% over the next few years. The company insists that the IBM business, mainly in graphics displays, is important; it's just that the rest of the company has been growing at a faster pace.

Bhanu Bhattasali, director of the printer group at market researcher Dataquest Inc., is bullish on CalComp's new look. "CalComp is moving very aggressively; they are positioned well with a full line of graphics devices," he says. That full line of product was a clear attraction to Beaverton, Oregon-based Mentor Graphics Corp. In a $3 million OEM deal inked in January, CalComp beat out HP and Versatec to supply the



CalComp is giving HP a run for its money in pen plotters — and beating up on Versatec in electrostatics

Sales and marketing chief Larry Sanders has been the architect of the focus toward PC-oriented products

CAE giant with pen, thermal-transfer and electrostatic plotters.

Explains Mentor president Gerard Langeler: "We did a very exhaustive analysis of both product technology currently and the future plans of the major players in the graphics-peripherals business. [We looked for] two things: quality and breadth of product line, so we could deal with one supplier. CalComp not only won that evaluation but it was a reasonably clear win; it was not a nail-biter."

Langeler was well aware of the part played by CalComp's revamping of manufacturing: "That was part of our analysis. Their quality approach to manufacturing is particularly important for electromechanical type devices which are much tougher than electronic devices to manufacture to very high quality; CalComp appears to have done a very good job on that. They will by far and away be the major percent of the hard-copy portion of our business," he predicts.

A long way

It is clear that CalComp has come a long way since it was created by its former parent, Sanders Associates Inc., a military electronics company. In 1986, Sanders was acquired by Lockheed, and CalComp became a major component of Lockheed's Information Systems Group (ISG). Lockheed maintains a hands-off approach when it comes to CalComp's strategy and tactics, and has not contributed significantly to CalComp's restructuring investment. "We run the company independently," asserts Conlin. Today, digitizers account for about 10% of total sales while plotters make up 50% and displays the remaining 40%.

However, CalComp has not always gotten it right. In 1984, it established, with much fanfare, a separate business unit for PC peripherals that it hoped would help drive the company toward $1 billion in revenue by 1990. The unit helped give PC-oriented products a start, but it did not emerge as a viable independent operation and was rolled back into the three basic divisions.

Despite these occasional setbacks, it now seems evident that CalComp finally has its act together. Earl Payton, chairman of $20 million-a-year Cowden Metal Specialties, a Chino, California-based maker of cabinets, says that he used to do some work for CalComp nine years ago. "They were absolutely terrible, they had no business plan and were so fragmented it was truly a joke," he says. Now, says Payton, CalComp is like a new company. "They have made a ten thousand percent improvement."

But CalComp still has its work cut out in trying to stay ahead of the pricing game. Arch-enemy HP has recently vaulted into the electrostatic plotter arena for the first time, challenging both Versatec and CalComp with its new 7600 monochrome model whose price begins below $23,000. "We think it will just devastate Versatec," gloats Conlin. So what does he think will keep CalComp immune? A new line of monochrome electrostatics to be unveiled next month — and yet more pressure on manufacturing costs. □

CalComp is *not* for sale . . . but

Lockheed is selling off one subsidiary. Will CalComp Inc. be next? Most say no, but it could depend on the price.

In early May, CalComp's parent, Lockheed Corp., put one of its Information Systems Group (ISG) companies up for sale. The announcement spawned speculation that maybe Lockheed was changing its mind about the remaining handful of ISG companies, including CalComp.

At press time, Dialog Information Services Inc., one of Lockheed's electronic information services companies, was still on the market awaiting a buyer. The asking price is reported to be in the $200 million range, twice the company's annual sales and 10.5 times its earnings. Two information-services giants — McGraw-Hill Inc. and Mead Data Central, a unit of Mead Corp. — are reportedly interested.

The official word from Lockheed is that CalComp is safe and sound just where it is. "The company has no other plans for divesting any other divisions," comments Richard Bennett, director of marketing at Lockheed's ISG.

But what Lockheed might say and what it might do — under the right circumstances — might be quite different things, analysts say. "I wouldn't be surprised to see them sell [CalComp] at some point if they find someone willing to pay what they consider a good price," comments Paul Nisbet, first vice president at Prudential-Bache Securities Inc., in New York City. A good price, analysts say, would be something over $400 million.

David Bradley

HP turns to RISC and Unix to turn around the company

Hewlett-Packard bet early on RISC and Unix for its Spectrum computers. Those bets are now paying off, as HP challenges both IBM and DEC

BY MARY JO FOLEY

Some analysts are calling Hewlett-Packard Co. the "new Digital Equipment Corp." That's quite a turnaround for a computer company which is still largely viewed as an instrument maker in some quarters.

However, HP is, in fact, a strong player in computers. For fiscal 1987, ended October 31, an estimated 65% of its total $8 billion revenue was attributable directly to microcomputer, minicomputer, software and peripherals sales.

Even Hewlett-Packard's critics grudgingly agree that it seems to have pulled off a coup in the past couple of years by switching computer architectures and introducing a Unix-based line in a way that's proven to be relatively painless for its customers. The dual strategy also put the brakes on HP's loss in market share, making it a clear challenger to the computer "establishment" — giants like DEC, IBM, NCR Corp. and Unisys Corp.

In many ways, analysts say, the success of HP is testimony to the growing importance of a nonproprietary operating system (Unix) and a new microprocessor design (reduced instruction set computing, or RISC) to the computer industry.

But despite HP's apparent success, the changeover to Unix and RISC has not been particularly easy. Analysts say the transition has cost the company an estimated $250 million in R&D time over the past five years. HP's Spectrum team also had to deal with the frustrations involved in an almost year-long product introduction delay.

Manufacturing Systems Group VP William Parzybok credits HP's top management with the decision to plunge into RISC and Unix

First in, first out

However, several years ago, with the announcement of its midrange line of Spectrum computers, HP was the first of the big computer firms to declare backing for RISC. As RISC fever has grown and various Unix versions have gained prominence, that strategy has positioned the company well, analysts say.

William Parzybok, vice president and general manager of HP's Engineering and Manufacturing Systems Group, suggests the decision to switch architectures and operating systems was based largely on technical criteria. "We made extensive measurements of what different computer architectures did," Parzybok says. "We did this with our own computers in our own labs. We chose the RISC architecture based on what people were actually doing with their systems."

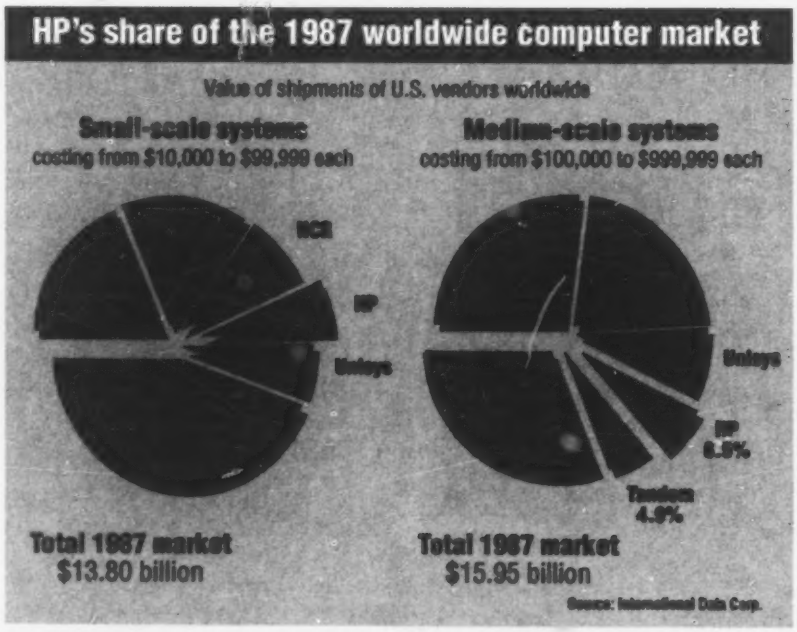
Once the decision was made, Parzybok says, the company never looked back. "Management made a real commitment to the architecture," he recalls. "We put our money where our mouth was."

The computer industry will be in a better position to judge the soundness of HP's investment within the next year or so. That's when HP's

two top competitors, IBM and DEC, are expected to fully launch their own Unix and RISC strategies. IBM already has made exploratory forays into both areas with AIX, its recently announced Unix scheme, and its RT personal computer; Digital Equipment has been pushing half heartedly its Ultrix Unix product for some time, but has yet to introduce a RISC-based system.

Other traditional midrange vendors, such as Data General Corp., NCR, Unisys and Wang Laboratories Inc., likewise are expected to capitalize on Unix and/or RISC. At the same time, niche-oriented companies — targeting multiprocessing, parallel processing, work group computing, and networking environments — are expected to join the Unix and RISC charges.

Add to this hodgepodge the ongoing standardization debates regarding "whose Unix" and "whose RISC chip" are "best," and you have a picture of the uncertain world into which HP has plunged via its so-called Precision Architecture systems, known in house as Spectrum.



HP is once again a force to be reckoned with. Some are even calling it the "new IBM"

Risky RISC?

"Our decision about going with RISC [and Unix] was never seen within HP to be as risky as the press portrayed it," claims Timothy Haney, sales manager for HP's technical computer group. "Adherence to standards was what was seen as risky, as were decisions regarding open environments, timing, and customer freedom." Indeed, the way Haney tells the story, it almost seems as if HP couldn't have improved on its strategy for switching architectures if it had had a tailor-made business plan to follow.

But in the early 1980s, when most of the RISC players were start-ups — such as Celerity Computing, MIPS Computer Systems Inc., Pyramid Technology Corp., and Ridge Computers — HP's decision to go the RISC route looked anything but sure. However, "an overwhelming amount of data pointed to RISC" as the superior choice, Haney says. RISC's promised benefits — reduced design complexity, and thus increased price/performance — seemed to be just what the doctor ordered for HP's case of midrange malaise.

Once the decision was finalized, Haney says, developing the hardware was relatively easy. Even devising a version of Unix optimized to run on its new RISC systems was relatively straightforward, as evidenced by HP's rapid shipment in late 1986 of its first Series 9000 models. The hard part was writing a new, fully compatible version of MPE, the company's proprietary operating system for its RISC-based machines. But after much publicized delays and resulting warnings of customer defections — which never materialized — HP shipped its first commercial models by the end of 1987. In what turned out to be a stroke of brilliant foresight, HP also established so-called Software Evaluation and Migration Centers, complete with HP computers and technical personnel, to aid independent software vendors, and more recently, individual customers, in moving their applications software to the new HP systems.

Observers say Spectrum has enabled HP to stem its decline in midrange computer market share

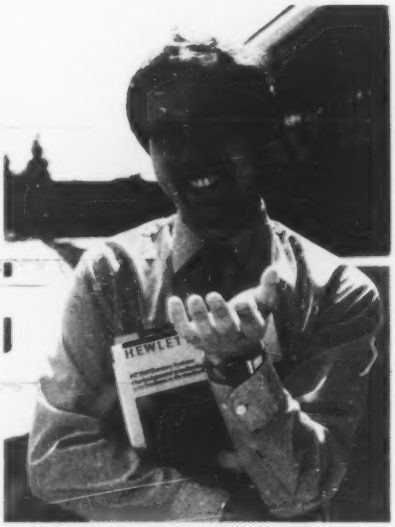
Following an April 1988 rollout of seven new Precision Architecture products, the family now consists of full-fledged commercial and technical lines. Both share common central-processing units (based on HP's proprietary RISC chips), datacommunications facilities, databases and compiler software tools. The only difference between the two lines is the type of software they run.

The business systems, which run HP's proprietary MPE XL operating system, are an extension and replacement of its existing 3000 series. The technical systems, known as the HP 9000 series, run HP-UX, HP's version of Unix, based on both AT&T's System V and Berkeley Unix.

This scenario is not exactly static, though. With the debate over the future of Unix as an "open" system, and HP's decision to join with IBM, DEC and others in forming the Open Software Foundation, the exact "flavor" of HP's Unix may shift over time.

Meanwhile, HP's strategy appears to be paying off. Already, a number of industry watchers say HP's Precision Architecture has enabled HP to

stem — and even begin to reverse — its decline in midrange market share. According to the Framingham, Mass., market research firm International Data Corp., HP captured a solid 6.5% of the midscale ($100,000 to $999,999) computer market last year. It likewise garnered 6.4% of the total value of shipments of U.S. vendors worldwide of the small-scale ($10,000 to $99,999) computer world, says IDC. Whether HP will steal market share from firmly entrenched IBM or DEC is questionable. But HP, with its claim "that it will compete with anyone on service, product quality and price/performance," in the words of IDC analyst Art Hutchinson, "is one of the only companies that can still say that credibly."



David Hoover, product marketing manager for MPE systems for HP's commercial Systems Group

Well positioned

"HP's well positioned to be the third player in the top tier" of midrange vendors, concurs John McCarthy, the director of professional systems services for Forrester Research in Cambridge, Mass. "They've got a big jump on the market with RISC." The Unix-RISC combination positions them, even more importantly, to capture a sizable piece of what McCarthy calls the "high-end server" market. As the traditional minicomputer market continues to decline, personal computers networked with high-power servers will be the new growth segment of the industry, he says. McCarthy predicts that 47,000 of these servers will be shipped this year; 173,000 will be shipped by 1992. HP could capture as much as 15% to 20% of this market by then, he claims.

In addition, HP is showing a strong understanding of the directions the computer market is taking, industry watchers say. Unlike IBM and DEC, "HP already has a strategy based on supporting PCs [personal computers], rather than terminals," explains Marty Gruhn, vice president of The Sierra Group, a Tempe, Arizona-based market research firm.

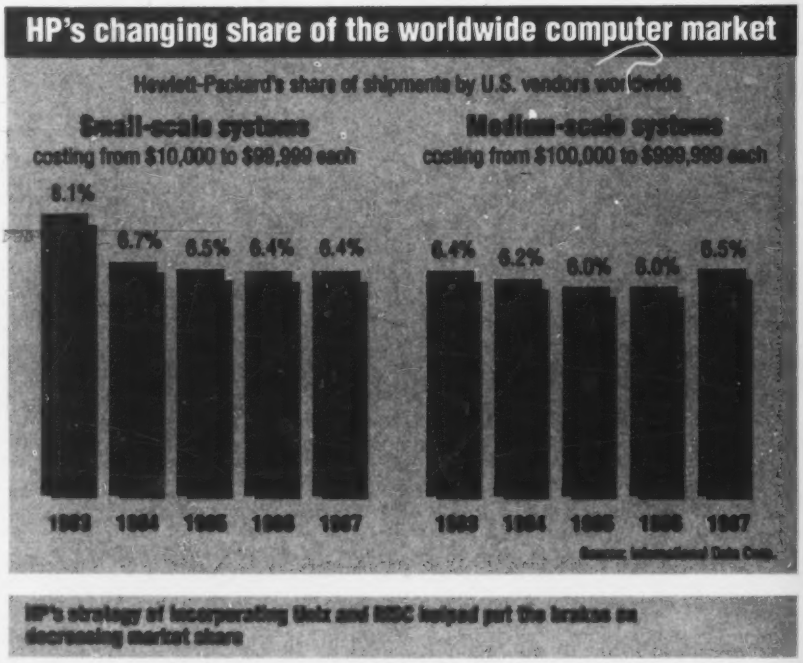
On the downside, while "all of its produce niches are filled, in some cases, HP's products aren't as viable as they need to be," Gruhn says. For instance, HP touts connectivity between its business and technical computers — thanks to its use of the same CPU, chip set and datacommunication links. However, almost none of its customers are at a point where it currently needs to interface these various systems. Another area on which HP needs to concentrate is marketing. The company's salesforce is still much more technically oriented than commercially oriented, although remedying this shortcoming is a corporate priority, Gruhn acknowledges.

In the coming year, HP also will need to build up its stable of application software vendors — especially ones willing to write for its NewWave interface. So far, NewWave is available for HP PCs only; but within a year, the interface could be available for the Precision Architecture systems. However, a lot will depend on what happens in the "look and feel" suit launched by Apple Computer Inc. against HP over alleged similarities between NewWave and Apple's system software.

At the same time, HP is sure to be working on a parallel-processing version of its RISC-based series, and possibly some lower end CMOS-based minis to round out its line, according to Forrester Research's McCarthy. Some type of clustering scheme, along the lines of DEC's VAXCluster, also could make its debut by early 1989, he says.

But the major hurdle for HP with its Precision Architecture line will be in "making the portability of software transparent to users," while simultaneously making the benefits apparent to them, says David Hoover, product marketing manager for MPE systems for HP's commercial systems group. Both RISC and Unix are technologies which are best appreciated when least noticed. HP's challenge will be in keeping them that way. □

Lane Erkeis



HP's strategy of incorporating Unix and RISC helped put the brakes on decreasing market share

Computer makers look to emerging offshore markets

It's been a banner year for U.S. manufacturers abroad, thanks in part to the dramatically lower dollar and a new generation of computer gear

BY MARTY CHASE

For the U.S. computer industry, 1988 is rapidly becoming the "Year of the Export." The chief executives of many of the country's largest computer makers, like Digital Equipment Corp. and Hewlett-Packard Co. and IBM, all acknowledge that fact. But it's a trend that many smaller companies, including new electronics industry start-ups, are starting to take advantage of as well.

What is happening, in a nutshell, is a boom in computer buying throughout the world, especially in Europe, but also in many key Asian markets and even in some developing world nations. "There's been a tremendous boom in our industry throughout the world," says Charlotte LeGates, an executive at the Computer and Business Equipment Manufacturers Association, a leading trade association.

"Business is going great guns for us," says John Young, chief executive of Hewlett-Packard. "It is one of those rare times when almost everything is going well. Our exports are strong in all parts of the world." HP will export more than $1.5 billion this year, he adds.

"Of course, the lower dollar has been a big factor," Young says. "We think it'll go even lower [in Japan], maybe as far as 100 yen to the dollar. Frankly, we wouldn't be surprised to see it go that low. But it all depends on the rate of change — how fast it falls. Nobody wants to see it get there too fast. We would face some real problems if it fell too quickly because it would probably crimp the ability of the Europeans and others to keep on buying U.S. machines."

Kenneth Olsen, chief executive at Digital Equipment Corp., concurs. For his own company, however, he notes that half of DEC's business is overseas. "This has always been the case, so the dollar impact is not as great on us as it might be for some others," he reasons.

HP and DEC are not alone. Compaq Computer Corp. also recently reported it had tripled exports in 1987, up to roughly $380,000, about a third of its entire revenue. And earlier this

Export dos and don'ts

A brief listing of exporting "dos and don'ts" provided by the Commerce Department as part of its Export Now program.

DO develop a business and marketing plan before you start. Have clearly defined goals and objectives and know how you are going to reach them.

DO get top management's commitment for the long haul. It takes time, money and patience to be successful. It may be years before you see results, especially in hard-to-crack markets like Japan and China.

DO exercise caution in selecting your representatives overseas. Evaluate your foreign staff personally. These will be the people representing you and handling your products.

DO establish a base for orderly growth. It makes sense to start with one or two foreign markets first, perhaps in places like Canada or Britain, where you don't face language barriers. Start fairly small and build upon that base.

DO modify or change your products to comply with local rules, regulations and culture. Make the needed modifications to products at the factory.

DO print sales, service and warranty data in the local language. And, another consideration just as important, make sure you have a solid translator. Cutting corners on this can spell disaster.

DO consider using an export management company. This is good advice especially for a smaller firm. Export management companies are facilitators who will sell your products overseas without necessarily taking title to the goods.

DON'T be a fair weather exporter, letting the export side slide when domestic business is good. That damages your reputation and leaves you without any recourse when your home market falls off.

DON'T treat exports as an afterthought. If you try to boost domestic sales through advertising, discount offers, special promotions, etc., then apply these same incentives to your overseas markets too.

DON'T assume the same marketing techniques work everywhere. You must study, learn and follow the various cultures. Negotiations can be long-winded and often follow a prescribed set of rules.

DON'T fail to provide support services. All products need servicing. If you don't provide it, your reputation will suffer. □

year at an elite CEO gathering of the 75-member Business Council in Hot Springs, Va., IBM's John Akers said his company is extremely pleased with the "very strong market for exports, most notably in Europe."

IBM's international efforts

"Business in the industry is good," Akers asserts. "For us, it's better outside the U.S. than it is inside the U.S. Markets in Japan and Europe are growing the fastest, and we expect this to continue, certainly for the rest of this year."

Akers and others note that the current boom in buying computers and related equipment seems to be fueled by several factors: first, there is new low-end and relatively low-cost equipment coming onto the market; secondly, sophisticated high-end machines are becoming standard. Add those factors to the low dollar and you have a situation in which computers and products have become one of the nation's strongest exports, accounting for nearly one in every 10 dollars on the export side of the U.S. trade balance.

But the industry giants have long been major players in international trade. The big story in the new export boom is the emergence of a new wave of international competitors, many of them in the electronics industry, which are boosting their overseas sales by leaps and bounds.

Richard Cavanagh, a vice president at McKinsey & Co., analyzed a number of these companies in an extensive report called "Winning in World Markets."

Cavanagh believes there are some important lessons to be learned from the way these outfits approach exporting. "In a way, they're the same as their predecessors, but in an important way they are different," he says. The basic difference with this new breed of international firms is they are competing on the value of their products, he says, "not simply on cost."

A prime example is Cray Research, which is moving aggressively into Japan, taking on the Japanese supercomputer giants like Fujitsu Ltd. in its own backyard. Cray has established country organizations that handle marketing, sales and service functions, and give local managers plenty of room to maneuver. For example, the country manager at Cray has considerable control over marketing of used equipment in that territory, can determine trade-in credit for upgrades and sets all service fees, Cavanagh notes.

Cray also has the managers of its six leading overseas subsidiaries report directly to internal boards of directors, which include their peers from various functions and U.S. regions. These are chaired by executive vice presidents. And, significantly, all country managers have direct access to John Rollwagen, the chief executive. "In effect, we govern, not manage," says Marcelo Gumucio, marketing chief at Cray.

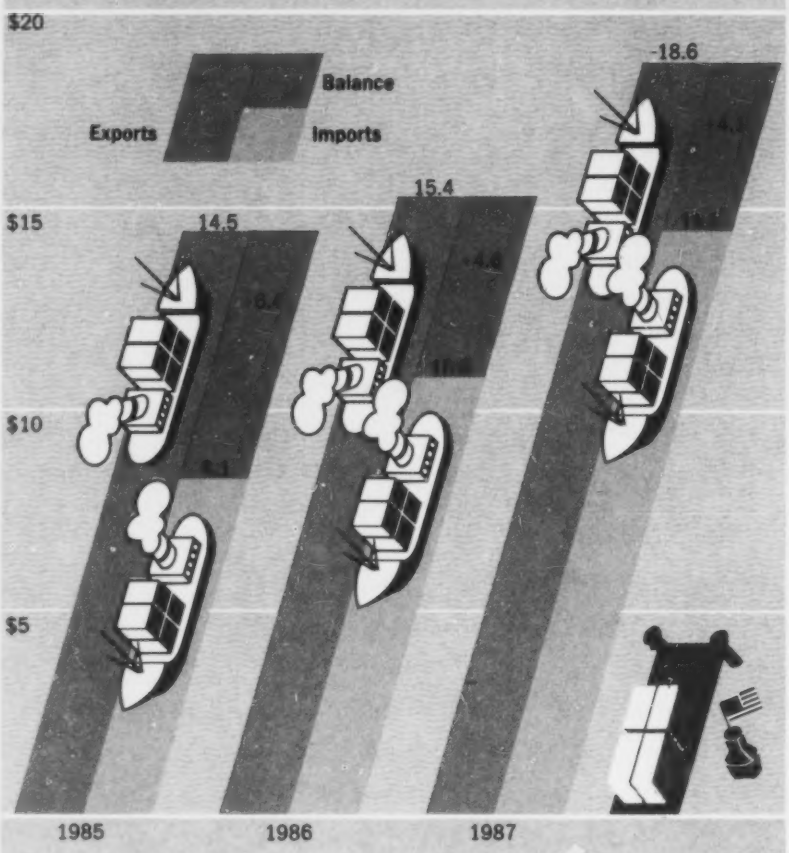
Smaller firms can also benefit from the export boom. The world market is about four times larger than the U.S. domestic market," Commerce Secretary William Verity said at a recent Washington briefing. "With the dollar down, exporters will find that additional product lines may now be competitive in both old and new foreign markets."

Verity is spearheading a Commerce Department program called Export Now to boost U.S. exports, and the timing couldn't be better. "This campaign is aimed primarily at firms which have dismissed the idea of exporting in the past," he says. This is the time they should be "reexamining" this decision, Verity says.

Export Now does not include funding for any new government programs or money to directly aid exporters. What it will do is help direct companies, especially small- and medium-sized companies, into the export business, providing a range of market data and other informational aids. □

COMPUTER TRADE BALANCE

U.S. exports and imports of computers and related products ($ billions)



Source: U.S. Department of Commerce

Computer exports are increasing rapidly, but imports are rising at an even faster rate.

Phil Scheuer

The Navy launches a parts program to spur productivity

Called RAMP, the South Carolina-based experiment is already eliciting keen interest from IBM and other prime contractors

BY ANNE HYDE

A $50 million contract may seem miniscule when compared with most Department of Defense (DOD) contracts, but there's one new U.S. Navy contract which may be worth watching. It's called RAMP, for Rapid Acquisition of Manufactured Parts, and its contract managers claim it could help the United States become more competitive in low-volume manufacturing of electronic parts.

RAMP is the Navy's answer to controlling costs and guaranteeing rapid acquisition of replacement parts, including electronic components, for ships and aircraft. Ground was broken last spring in Charleston, S.C., for the new RAMP test and integration facility to serve as a model for automated manufacturing of small machine parts and printed wiring assemblies. Within two and a half years, the facility is expected to begin turning out small ship or aircraft parts and circuit boards.

Prototype factories of the future will be built. A computerized description of a part will drive machines and robots to not only manufacture the part, but also perform test and measurement. By 1991, officials hope the project will lead to facilities for producing small machined parts at the Charleston Naval Shipyard, the third largest shipyard in the United States, and cells for turning out printed wiring assemblies at the Naval Avionics Center in Indianapolis, Ind.

M.C. Velarde

RAMP implementation chief Bernard Farley: "What we want to do is push this JIT technology out to component vendors"

Navy inventory control points will eventually be tied into a computerized bid-order database. RAMP will use digitized technical data and drawings, along with computer-integrated manufacturing technology to turn out limited runs of low-demand small machined parts and circuit boards.

The Navy has stong reasons for wanting to transfer this technology to private industry. "Our motive by transferring it to private industry is to improve our own industrial base . . . What we want to do is push this just-in-time technology out to component vendors," says Bernard F. Farley, RAMP implementation manager at the Naval Supply Systems Command in Washington, D.C. Another critical objective is to reduce the procurement leadtime on some military components from 300 to 30 days.

At the same time, there is also widespread interest in the technology because private industry could eventually apply the RAMP concept to a more ambitious parts-on-demand capability. For this reason, a number of U.S. electronics companies — including IBM — are currently evaluating the program.

IBM's interest

Indeed, Big Blue is so interested in the project that a company representative has been assigned in Charleston specifically to track the RAMP project with hardware and software. "Right now, our motive is to demonstrate that IBM has the capability that RAMP is looking for in terms of applications and commercial off-the-shelf hardware and software. We're looking at this as more of a chance to showcase our technology rather than to make a lot of money from any initial supply contract to RAMP," says Hossein Parsapour, ac-

count market developer for IBM.

"I think the most important thing this could demonstrate is the ability to produce replacement parts on demand. Potentially, companies that are in the business, such as IBM, could use these kinds of RAMP facilities rather than maintain huge inventories. In most cases, companies project how many parts they need and maintain stockrooms and storage area. In that case, you end up wasting a large amount of dollars and resources to stock the parts. In this case, you can order through the system for replacement boards on demand," Parsapour says.

Parsapour notes that much of the technology already is out there, but he says it has yet to be widely applied. "This brings together a lot of components that already exist. This addresses the complete package, starting from the storage of electronic data and the storage of all parts without human intervention on the factory floor," he says.

Pockets of this exist, but the RAMP facility is the first to bring the whole thing under one roof," Parsapour explains. He says IBM could supply companies with RAMP-like capabilities, and also apply the technology internally. "There are companies that might decide they can use this to be more competitive in producing parts for the military," he adds.

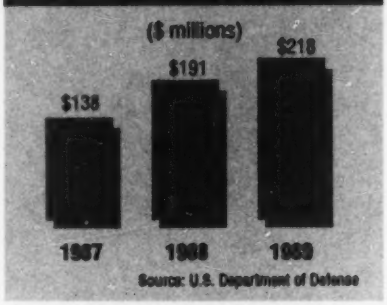
Broad interest

IBM isn't the only one interested. Among others, Digital Equipment Corp., Prime Computer Inc. and Tandem Computer Inc. all are vying for contracts to supply RAMP hardware and software.

Through a program designed to encourage technology transfer, as many as 200 companies have been invited to participate in seminars to see what the RAMP project has to offer. Private industry is being invited to participate either by sharing technological expertise or lending associate staff members to the project to learn about the technology and bring it back to the companies.

Westinghouse Electric Corp. already invested $2.5 million of its own money in 1985 as part of a $4 million joint project with the Navy to demonstrate a workable flexible manufacturing cell for printed circuit wiring assemblies. "It was a multi-approach

DOD's spending on RAMP and related projects



The DOD will not break out RAMP's exact budget, but RAMP accounts for the major part of this program called Computer Aided Acquisition and Logistics Support

at the time. There was a great deal of sensitivity as to the cost of spare parts. We wanted to take advantage of manufacturing small parts and printed wire assemblies. Specifically, we were building on our own automated electronics assembly facility that we designed in College Station, Texas," says Richard Drake, director of advanced production technology at Westinghouse's Electronic Systems Division in Columbia, Md.

"The technology was there. What we wanted to do was to package it. The internal project was designed to see how we could reduce costs and

One goal is to cut lead-times on some parts from 300 to 30 days

leadtimes. We wanted not only to be able to use it internally, but also to successfully demonstrate it to the Navy," Drake explains.

He notes that Westinghouse and the South Carolina Research Authority, a key RAMP sponsor, now are discussing possible enhancements that Westinghouse might provide for the RAMP project. The technology is old enough, according to Drake, but it has so far been limited to high-volume production and a small range of products.

"Flexibility is becoming quite the demand. The Japanese are great at high volume. But they know now that the Koreans are beating their pants off in this area of low-volume manufacturing. You're seeing it already in the area of mechanical parts. For electronics, it's here and now and it's just a matter of getting the mindset ready for it," Drake says.

Small lot sizes

"We're talking about producing a wide variety of random printed wiring assemblies in an eight-hour day in lots as low as one," adds Farley. "Industry is finding that in order to compete, they've got to respond to customers in small lot sizes," he says.

Although there are islands of automation where the technology is being used now, it is so far limited to specialized applications buried in very large electronics companies, according to John Simpson, of the National Bureau of Standards, which is heading up a joint effort among industry and government to come up with a technical data standard for a digitized technical data package. "What we're attempting to do is demonstrate that it can be scaled down to smaller companies," Simpson says.

Under the leadership of the South Carolina Research Authority (SCRA), the American Manufacturing Research Consortium was established to bring together the technical expertise to develop RAMP. The consortium includes Arthur D. Little Inc., the Battelle Memorial Institute, Grumman Data Systems, Ingersoll Engineers Inc. and the SCRA.

The research authority is a nonprofit state agency that promotes high-technology research and development in South Carolina. It won the initial $50 million contract from the Navy to develop the plans and high-level specifications for RAMP.

But Curtis Holcombe, an Arthur D. Little official, believes it will take some time before electronics companies are as enthusiastic as the aerospace community over the RAMP project. Since all of the technology is nonproprietary, companies aren't rushing to embrace the project, he says. "The business climate would have to change for electronics companies before there would be a lot of enthusiasm because they generally consider their design to be proprietary," Holcombe says. But cooperation between companies is "absolutely going to be necessary." □

CIM sales in Europe send the right signals to U.S. vendors

U.S. suppliers of automation equipment are teaming with European partners to cash in on the worldwide CIM upswing

BY JACK GEE

Computer-integrated manufacturing (CIM) is upsetting the cozy convictions of manufacturers of the die-hard generation. As new products are rushed to market at an increasingly dizzying pace, old assembly-line technology cannot cope with rapid changes of style and models. In the United States and Asia, flexible manufacturing systems (FMS) are playing a growing role in meeting these new challenges. In Europe's factories, automation and flexibility are establishing an even stronger foothold.

Bipe, a market research firm based in Paris, reports that last year Europe accounted for 26% of a $36.6 billion world market for numerical controls, robots and programmable logic controllers (PLCs), the workhorses of automated factory systems.

"That's twice the value of the PLCs which will go into U.S. plants," says Philip Emerson, European marketing manager for industrial systems at Texas Instruments Inc., which is headquartered in Villeneuve-Loubert, on the French Riviera. The Texas company is a leading vendor of PLCs, computer-based devices which, once instructed by a production engineer, continuously start, stop or alter the behavior of motors, valves, actuators and other devices.

In data-processing equipment for CIM, Europe shows the same lineup of suppliers as in the United States. Once again, IBM leads the pack in manufacturing management systems, followed by Digital Equipment Corp. and Hewlett-Packard Co. In computer-aided design and manufacturing (CAD/CAM), the familiar logos of Apollo Computer Inc., DEC and Sun Microsystems Inc. are highly visible. Philippe Fremeaux, client case team leader at market researcher Bipe says: "European companies are paying the price for slipping behind in the race for industrial software development."

The list of suppliers of CIM equipment in Europe includes the familiar names which are well established in the United States and Japan. Siemens AG, the West German electrical and electronics giant, made an unsuccessful bid to buy Allen-Bradley Co. three years ago in an effort to beef up its own position as a factory-automation supplier.

European companies are also alert to opportunities to team up with U.S. partners. DEC has formed Sesam, a 50-50 venture in factory automation with Comau, a robotics subsidiary of Fiat. This partnership is targeting revenue of $230 million by 1990. In a parallel match, IBM has teamed up with Elsag, the factory-automation arm of Italy's IRI-Stet electronics holding.

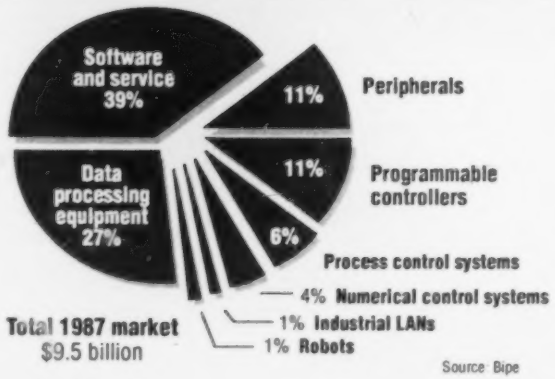
Setting their sights on the CIM market in the United States, European firms are signing up American partners too. The most promising alliances to watch are in West Germany, where Siemens and Westinghouse Electric Corp. have joined forces and AEG AG, a subsidiary of Daimler Benz AG, has bought Gould Inc.'s industrial automation division.

The Siemens-Westinghouse venture, which is U.S.-based, is 51%-owned by the American partner, which will contribute robot, process control and other businesses. The bulk of the sales are expected to be in the United States, where Westinghouse outsells Siemens in these sectors. Westinghouse is likely to be the leader in the factory-automation element, while Siemens can expect to show its strength in circuit breakers.

Europe's PLC power

But in PLCs, where they have been able to apply their long-standing experience in electromechanical engineering, the Europeans have been faring much better. Siemens, Telemecanique of France and ABB, the new partnership between Sweden's Asea AB and Switzerland's Brown Boveri Group, are performing well in this market. In France, Telemecanique, currently the target of a takeover battle for its expertise in this sector, is being challenged by April, a joint venture between Renault Automation and Merlin Gerin, a subsidiary of the big Schneider engineering and electronics group. Britain's General Electric Co. — no relation to GE of the United States

European flexible manufacturing systems market



Source Bipe

— has a strong position in PLCs on its home ground.

However, Europe's flagship computer companies, such as Britain's ICL, Italy's Ing C. Olivetti and Co. and France's Groupe Bull have failed to make an impact in the industrial market. Even Siemens, although powerful in many aspects of industrial data processing, is weak in applications.

Texas Instruments' Emerson argues: "FMS is even more crucial in Europe than in the world's other factory environments. The U.S. and Japan are big, single, homogenous markets. But Europe is composed of small, nationally oriented marketplaces. That means production runs are shorter than in U.S. factories. The European accent is also on batch manufacturing rather than on hard automation."

Automating at Alcatel

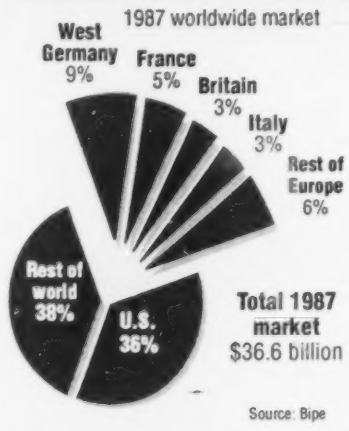
In Vienna, Helmut Amler, director of manufacturing at Alcatel Austria, is responsible for one of Europe's most highly automated plants. It produces the Amanda private branch telephone exchange (PBX), developed there before France's Alcatel took over ITT Corp.'s telecommunications business. The firm ships this entirely digital product to 50 countries. One-quarter of the output is sold in the Pacific area against tough Japanese competition.

Alcatel's Amler says: "We could not compete in this market unless we had fast information flow through our commercial and marketing operations right down to the factory floor. Only a few firms worldwide have achieved our level of CIM, which is based on a higly integrated DEC/IBM computer network. You have to be in CIM nowadays. Otherwise you flop. At ITT, we got the message early. We began working here with computer-supported test machinery 10 years ago when CIM was unheard of."

The success of Alcatel Austria's flexible manufacturing system is reflected in its production of printed circuit boards for public switching systems and PBXs. Amler explains: "We make 2,500 different types of board. We can even do batches of one. CIM has enabled us to get from the component stage to a complete PBX in only five days — compared with 48 days three years ago. And that means we are making production savings of $6 million a year." Alcatel has acknowledged the Vienna plant's performance by giving it worldwide responsibility, spanning ITT's former empire, for software technology, artificial intelligence and expert systems.

In West Germany, Nixdorf Computer AG's interest in automated manufacturing stemmed from its own requirements as a maker of minicomputers for office users. But now it is finding markets of its own for CIM among manufacturers. "This is a new business opportunity for a company which has not been visible until now on the factory floor," says Hans-Joachim Mosler, manager of Nixdorf's newly created CIM Technology Center. It is strategically located in Stuttgart, in West Germany's high-tech heartland, close to neighbors which include Daimler Benz AG and major machine-tool makers.

Flexible manufacturing systems market



Europe absorbs a quarter of the world's sales of factory automation gear

Nixdorf's CIM tactics

Nixdorf is offering hardware from its minicomputer range, which includes the 8860, 8870, 8890 models and the Unix-based Targon. The German firm is also consolidating its CIM posture, thanks to a technological alliance to develop and market sophisticated software products with Cincom Systems Inc. of Cincinnati. Klaus Luft, Nixdorf's chairman says: "We are contributing our Unix-based relational database system. Cincom provides its own expertise in the same area as well as know-how in fourth-generation languages and CIM."

Bipe's Fremeaux comments: "The Europeans are resisting better in PLCs than in computers. The market is very open indeed. There's a big and growing market for everything that is electronically programmable." In industrial local area networks, young firms, such as France's Compex and Aptor, are showing annual growth of over 25% and are making good profits.

A stimulus to CIM in Europe comes from manufacturing automation protocol (MAP), the growing collection of rules and standards for electronics communication in the factory established by General Motors Corp. "MAP's progression over the past couple of years and its acceptance by European manufacturers have been an important spur to factory automation," says Texas Instrument's Emerson.

But putting the brakes on European CIM practice is the reluctance of small businesses to exploit its advantages. Sergio Mariotti, director of the Automation Process laboratory at Mip Politecnico, a high-tech college in Milan, Italy, says: "There is a major problem in persuading small- and middle-sized Italian companies to adopt flexible manufacturing systems. Big companies are much more willing to make the necessary investment because they are convinced that it will pay off. They also have more funds available."

A Tower of Babel of operating standards is also deterring top management in many European companies and handicapping the introduction of factory automation. "That is why Open System Interconnection (OSI) is so vital," says Emerson. The British Department of Trade and Industry has joined forces with manufacturers to promote OSI. Together, they have funded a communications standards center in Melton Mowbray, England. Ronald Armstrong, director general of PERA, an industry-funded management training school, who also carries responsibility for the center, says: "What is needed is a much-enhanced awareness at company board level of the competitive advantages of CIM when it is used correctly." □

THIRD IN A SERIES

U.S. electronics in Japanese cars? Not with *that* quality

When Honda, Nissan and the rest set up U.S. assembly plants, American electronics suppliers got excited. They needn't expect to get rich quick

BY NORM ALSTER

Snowballs in hell haven't fared much worse than U.S. suppliers of auto electronics in Tokyo. With Japanese automakers closely tied to a limited number of domestic suppliers, auto electronics has been one of the hardest of all hard sells for American businessmen in Japan. U.S. share of Japan's automotive electronics — and the broad auto parts — market has not even reached 1% in recent years, according to data from the U.S. Census Bureau.

But now there is at least some reason to believe that change is in the air. In the past 10 years, reports the U.S. General Accounting Office, Japanese carmakers have invested $5 billion in establishing U.S. auto assembly operations. By 1990, they are expected to produce 1.8 million cars annually in the United States. American Honda Motor Company Inc. and Nissan Motor Corporation U.S.A., the two largest and most entrenched Japanese transplant producers, both declare their intent to source the bulk of their supplies in the United States.

On the surface, then, it would seem that things can only get better for U.S. auto electronics suppliers. To some extent this is true. But for a variety of reasons, U.S. auto electronics manufacturers will not get rich quick on the transplants.

For one thing, the Japan-based auto electronics suppliers of Honda, Toyota Motor Corp. and Nissan have also begun to migrate to the United States. There are now, by most accounts, somewhere between 100 and 200 Japanese-affiliated auto parts suppliers in the United States, at least double the number of 1984. And their ranks will increase by more than 60% over the next four years, according to the management consulting firm of Easton Consultants Inc. These companies have relocated around the transplant auto maker hubs of Marysville, Ohio (Honda), Smyrna, Tenn., (Nissan), and Georgetown, Ky., (Toyota). They are intent on securing their ties with their traditional Japanese customers. They're also intent on expanding their business to supply General Motors Corp., Ford Motor Co., and Chrysler Corp.

Just as U.S. firms would like to crack the Japanese market, Japanese suppliers of semiconductors and such automotive electronic subsystems as engine controls, instrument clusters and audio systems are intent on selling to American automakers. And North America, quicker to set pollution standards and more partial to feature-rich luxury vehicles, is a much better auto electronics market than Japan. Cars sold in North America contained an average of $263 of nonentertainment electronics last year versus just $113 per car sold in the Asia Pacific region, according to Motorola Inc. "They're definitely looking at the U.S. market as a way to grow their business. And it's definitely a threat to us," reasons Michael Eisele, co-general manager of automotive operations for Intel Corp.

Another reason why Japanese auto-electronics suppliers are setting up shop in the States

It is clear, then, that the Japanese will try to sell here. But will the Japanese automakers and their subsystem suppliers actually buy here? On the surface, at least, the answer is yes. Honda and Nissan claim that they already do, domestically sourcing more than 60% of their parts. Honda, says vice president of purchasing David Nelson, will have 75% domestic content in its U.S.-built cars by 1991. Nissan vice president for engineering and purchasing Robert Drake claims 65% domestic content today and expects his Tennessee operations to be "near 80%" by 1990. Although Toyota and Mazda Motor refused to discuss their procurement policies with ELECTRONIC BUSINESS, the U.S. General Accounting Office reports that they too will be sourcing 60% or more of their parts domestically within the next few years.

This looks like good news for U.S. suppliers. But once again, appearances are deceiving. The Japanese are buying seat covers, tires, carpets and even fuel pumps and steel here. But very little electronics. Gregory Shepard, industry analyst with Dataquest Inc., reckons that "probably less than 10%" of the auto electronics used by the transplants is purchased from American suppliers. Robert Macosco, a principal with Easton Consultants, says electronics are "the last thing the Japanese are going to source here." The Japanese, explains Macosco, view electronic systems as "strategic" since they strongly influence vehicle "feel" and performance; in essence, the very personality of a car. Honda's Nelson concedes that domestic sourcing of electronics falls

well below the current 62% to 63% level for Honda's overall purchases.

There are other reasons the sourcing numbers are misleading. Nissan's Drake points out, for instance, that the vehicles made in Smyrna, Tenn., are low-end models with relatively insubstantial electronic content. Nissan's Tennessee operations, he says, simply don't buy much electronics. But even economy cars sold in the United States require engine control electronics to insure compliance with fuel efficiency and emission standards. Nissan's engine control modules, it turns out, are now being manufactured in Harrodsburg, Ky. The manufacturer is Hitachi Automotive Products. Nissan's domestic content figures count Hitachi as a domestic source.

Strategic and financial incentives

Japan's subsystem suppliers have ample motivation for establishing U.S. operations. Their chief customers benefit by their proximity and beef up their domestic content numbers. The subsystem suppliers can also market more aggressively to the U.S. Big Three: Hitachi's biggest customer has been Nissan but next year, the Kentucky operations claim the U.S. Big Three will absorb 60% of sales. And, of course, the weak dollar makes production in the United States economically feasible.

But the transplants get a good deal in the United States for other reasons too. According to Congresswoman Marcy Kaptur (D-Ohio), the Japanese have shrewdly availed themselves of foreign trade zones, originally established in the United States to encourage exports. By locating U.S. operations in foreign trade zones, Japanese firms can import components from Japan, assemble them in the United States, and pay duties on the assembled product only; a considerable savings over paying normal component duties. In essence, then, such operations make imported components cheaper. The use of foreign trade zone for importing automotive parts has risen tenfold, from $225 million in 1982 to $2.6 billion in 1986; and $3 billion for the first nine months of 1987, according to the International Trade Commission. Japan accounted for 70% of the 1986 total: a cool $1.8 billion in subsidized imports that support Japan's U.S. automotive assembly operations.

Honda's purchasing vice president David Nelson: The difference between required quality levels at Honda and the Western automotive world is "day and night"

The Japanese have also been encouraged by financial incentives from state governments in job-hungry Appalachian and midwestern states. Giant auto manufacturers have received giant state subsidies: Kentucky, for example, lured Toyota with $125 million in incentives. Now, the much smaller electronics transplants are being courted as well. Ohio awarded $8 million in relocation incentives to foreign suppliers during one recent 17 month period. Nippon Seiki, a leading supplier of dashboard electronics, established its New Sabina Industries in Sabina, Ohio. One reason was the $150,000 grant from the state of Ohio for on-site "infrastructure" improvements in water and sewer systems, New Sabina acknowledges. Another reason was the $100,000 grant to train new workers. Another $50,000 training sweetener is due this year.

With the logic and rewards of relocation so persuasive, the tide of Japanese suppliers will continue to redot the industrial maps of Kentucky, Tennessee, Ohio, Indiana and Michigan. It is inevitable, therefore, that as a rising economic force in the United States, the subsystem transplants represent a challenge to U.S. subsystem suppliers. But don't they also represent an opportunity to U.S. component firms? Where, in fact, are these makers of engine controls, dashboard electronics and auto radios buying their sensors, connectors and integrated circuits?

New Sabina tells much the same sourcing story as Honda, its major customer. According to president Yasuyuki Kobayashi, New Sabina sources 50% of its supplies in the United States. But to date, none of its electronics are bought here. New Sabina does appear to be trying, though, and has qualified two U.S. manufacturers of flexible printed circuit boards. And Kobayashi does confirm one of Honda's claims: that Honda wants its U.S. suppliers to buy U.S. parts. Although Honda has not ordered New Sabina to buy domesti-

D.R. Goff

cally, it has "encouraged" the use of American suppliers, according to Kobayashi.

Bernard Pierce, vice president for manufacturing at Alpine Electronics Manufacturing of America Inc. in Greenwood, Ind., says he too would like to use more American suppliers. But what does a leading Japanese audio electronics manufacturer do when stranded in the middle of the United States: a country whose consumer electronics industry it has helped to erase? With consumer electronics components as plentiful as needles in Indiana haystacks, Alpine shops its transistors, diodes and integrated circuits in the Far East. But Pierce says he is "getting familiar" with potential American suppliers and that U.S. electronics may be designed into future Alpine products.

An arduous process

For would-be suppliers of New Sabina, Alpine and other Japanese transplants it's simply going to take time. This, of course, is not a comforting message to companies that have cooled their heels for years in Tokyo. Intel, for example, has been trying to qualify as a Toyota supplier for more than eight years. For all its efforts with Toyota and others, Intel can claim just two Japanese designins: one for EPROMs packaged in the engine controls Hitachi sells to Nissan and another for a microcontroller used in a vehicle sold by Nissan in Japan. Still, Eisele and others believe that the Japanese are becoming more receptive.

"We see a definite interest that's increased rapidly in the last two years," he says. "They feel the overall pressure of the trade situation. In addition, over time they do want to become good local community companies with a local supply base." Eisele says after nearly a decade that produced just two design-ins, Intel is now "in the process" of qualifying for half a dozen new engine control and electronic braking applications with Japanese manufacturers.

"We have seen some customers taking a softer line," says Brad Marshall, vice president for sales for the semiconductor group at Sprague Electric Co. Marshall is hopeful of selling magnetic sensors for use in electronic braking, suspension and ignition systems to be built in 1991-1992 model year Japanese vehicles.

Japan's automakers have built U.S. facilities...

	Production start up	Annual capacity
Honda Marysville, Ohio	1982	360,000
Nissan Smyrna, Tenn.	1983	265,000
Toyota Georgetown, Ky.	1988	200,000
Mazda Flat Rock, Mich.	1987	240,000

Source: U.S. General Accounting Office

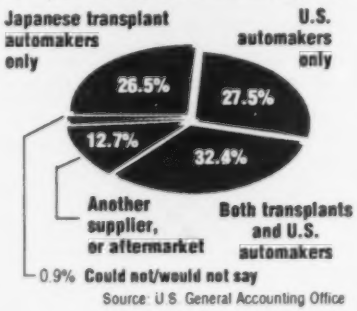
...but their Japanese electronics suppliers have tagged along...

	Date set up	Customers
Hitachi Harrodsburg, Ky.	1986	Nissan
Nippondenso Battle Creek, Mich.	1986	Mazda, Toyota
Nippon Seiki Sabina, Ohio	1987	Honda
Alpine Greenwood, Ind.	1987	Honda
Clarion Walton, Ky.	1987	Nissan

Sources: U.S. International Trade Commission, ELECTRONIC BUSINESS

...and some are winning U.S. automakers' business selling to:

Survey of 102 Japanese transplant suppliers



Source: U.S. General Accounting Office

It's hopeless trying to sell the Japanese technology that is only equal to what they can get in Japan, according to Marshall. But the Japanese "lag a bit in sensors," and therefore may be in a buying mood. Frederick Tucker, senior vice president and general manager of Motorola's Automotive and Industrial group, admits to about a year and a half of fruitless sales efforts in Japan. But Tucker is also optimistic about breaking through with sensors.

Many of the Japanese transplants do appear to be sincere in their desire to source domestically. Why, then, do things seem to move so slowly? Consider the difficulties in qualifying at Honda, by all accounts the most progressive of the Japanese carmakers. Honda purchasing honcho Nelson estimates that fewer than 5% of all U.S. applicants are qualified. And it's "not at all unusual," he adds, for qualification to take between a year and a year and a half.

Japanese viewpoint

Americans often take the painfully arduous qualification process as stonewalling. But from the Japanese viewpoint, it is necessary to ensure the quality and responsiveness they demand from their suppliers. And in fact, there are deeply ingrained traditions in Japanese auto making methodology that make it especially difficult for them to swiftly overhaul their supplier base.

The Japanese carmakers, for example, have historically maintained exceptionally close ties with a relatively small number of suppliers. Whereas Ford has 2,300 large volume suppliers, and General Motors 3,500, Japanese automakers generally deal directly with 200 to 300 suppliers, according to a 1987 study by the U.S. International Trade Commission. The Japanese often single-source and they source fewer components, relying far more heavily on integrated subassemblies. Japanese suppliers are under long-term contracts, are involved closely in design and development and are expected to respond quickly to a carmaker's request for product changes.

Companies like Toyota, one of the most diligent of all industrial implementers of just-in-time manufacturing, have historically encircled themselves with suppliers capable of providing frequent delivery and dedicated and timely support. All these factors make it difficult for U.S. hopefuls to crack such tight partnerships as Toyota-Nippondenso and Nissan-Hitachi, particularly as the subsystem vendors set up manufacturing to support their automaker partners in the United States.

But the major reason American electronics suppliers have had a tough time, the Japanese insist, is quality. American suppliers, they say, are simply not tough enough or dedi-

cated enough in meeting quality requirements. These claims must be taken seriously. There is simply no escaping the fact that Japanese automobiles (particularly those of Toyota and Honda) are significantly more reliable, as evidenced by the yearly frequency of repair ratings of *Consumer Reports Magazine*. The Japanese claim that this is no accident, that it is the result of exacting attention to detail; a discipline many U.S. suppliers simply refuse to respect.

"We find in most cases that the Japanese quality is better," insists Nissan's Drake. He allows that American quality has improved over the last two years. "But a lot of American companies don't feel that it's necessary to have every part in here that's good. If they've got a certain reject rate they think it's OK. The Japanese don't think that way. The Japanese think that every part — every one of them — should be good. We see American companies that think if they get 98% or 99% of them good, they're OK.... But that really upsets your whole system," moans Drake.

Voicing much the same sentiment is Honda's Nelson. Honda is actively looking for American suppliers, he says, but many of them don't take Honda's stated aims seriously enough. "We expect basically zero defects.... Our goal is to have four hours of inventory.... They think we're quoting from textbooks." Because American suppliers are somewhat lax, adds Nelson, "it's with great difficulty in almost every instance that we localize parts with an American source."

Although he declined to name the specific systems involved, Nelson says Honda sources electronic subsystems from United Technologies Corp. and TRW Inc. Nelson, who was director of purchasing for auto components, worldwide, at TRW before joining Honda, speaks with awe of the automaker's standards: "I am absolutely flabbergasted with the level of quality that's required at Honda in comparison to the Western automotive world. The difference is between day and night." Still, Nelson insists that once American suppliers understand the seriousness of Honda's quality and service requirements they can pass muster.

John Stark, vice president for purchasing with Delco Electronics, says differences between U.S. and Japanese quality have narrowed. Stark buys from both U.S. (Texas Instruments Inc., Motorola Inc., National Semiconductor Corp. and Intel, most notably) and Japanese (Hitachi Ltd. and Oki) manufacturers. "I don't think we see a lot of difference today," says Stark. "The field reliability — domestic and offshore — is very good." Dale Spoon, automotive operations manager for Texas Instruments, also contends that there is now little difference in the quality requirements of Japanese and U.S. auto customers.

Nissan purchasing vice president Robert Drake: "A lot of American companies don't feel that it's necessary to have every part good. The Japanese don't think that way"

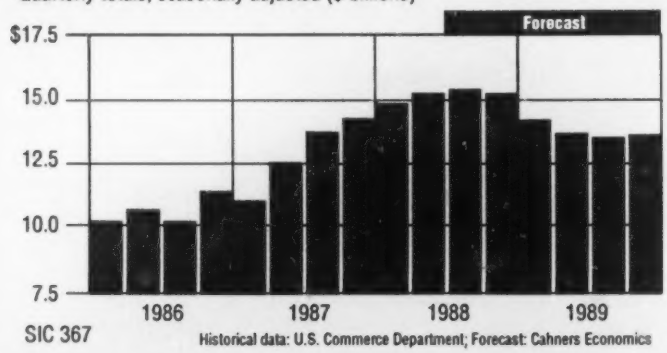
But Keith Casson, vice president with Sheldahl Corp., says Japanese customers have far more stringent qualification procedures. Casson should know, having just qualified as a vendor of flexible circuit boards to New Sabina Industries. "Yes, they have been more rigorous," says Casson of the Japanese. One test of flexible circuits, for example, involves folding and refolding the boards to see just how much crunching and creasing they can withstand. Japanese customers, he says, require "four times as many folds as the typical American company. Casson wonders whether the Japanese sometimes go overboard. "They have a tendency to demand more design safety or precision than their American counterparts, and possibly more than required."

Is U.S. quality really markedly inferior to Japanese? Or have U.S. manufacturers finally learned their lesson? Perhaps the most discriminating assessment comes from Masamitsu Okumura, president of Hitachi Automotive Products. He says that in Japan, most companies cluster closely in their quality capabilities. In the United States, however, "there is a wide range" of quality levels. "The best companies in the U.S. are very comparable to those in Japan," concludes Okumura. If this is the case, at least the best — and most patient — U.S. auto electronics suppliers should eventually stand to benefit from the transplants. □

Bob Schatz

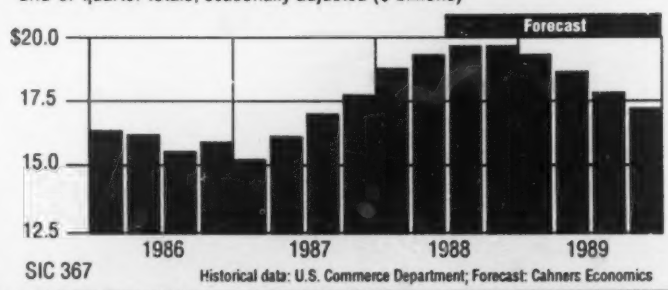
Electronic components — New orders

Quarterly totals, seasonally adjusted ($ billions)



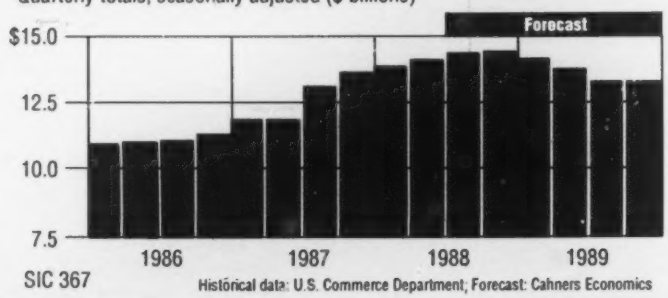
Electronic components — Unfilled orders

End-of-quarter totals, seasonally adjusted ($ billions)



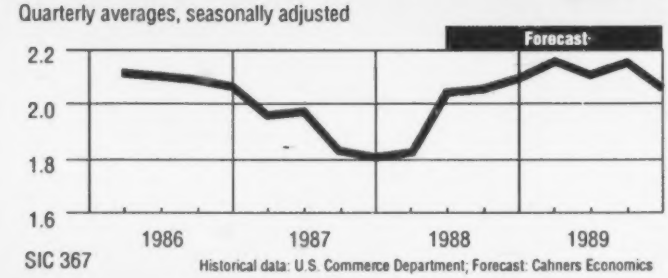
Electronic components — Shipments

Quarterly totals, seasonally adjusted ($ billions)



Electronic components — Inventory-to-shipments

Quarterly averages, seasonally adjusted



Component industry hits Lucky 13

After a long, depressing downturn in the mid-1980s, the current components recovery has been heartening. Still, many skeptics remain. After the layoffs and red ink of 1985 and the sluggish orders of 1986 and 1987, more electronics company managers are wary about late 1988 and 1989.

The latest data from the Commerce Department remains encouraging for 1988 at least. March marked an important event for the components industry: bookings outraced billings for the 13th consecutive month.

Comparisons

Not since 1983-1984, the industry's heyday, has the book-to-bill ratio remained so healthy for so long. Back then, more orders were booked than shipped for 17 months in a row. Comparisons between 1984 and 1988 help put the current economic recovery and possible 1989 downturn into perspective.

For instance, the book-to-bill ratio for the entire electronics component industry peaked at 1.31. That means bookings (new orders) were almost a third higher than billings (shipments). And the book-to-bill ratio back then often hit the 1.15 or higher mark.

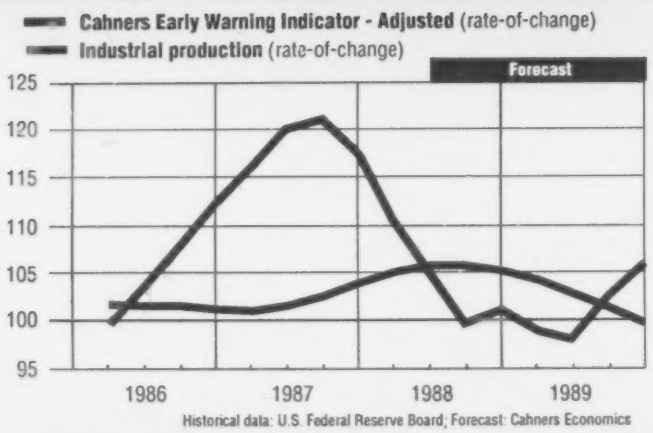
Now, in the past 13 months, the book-to-bill ratio has had trouble pushing past 1.10. This is not a bad sign. For an industry in which double- and triple-ordering caused a severe inventory crash in 1985, the current booking behavior is encouraging.

Coupled with relatively sedate new orders, inventory of components at U.S. factories remains extremely low. As of March 1988, inventories relative to shipments stood at 1.81. This number is meaningless unless it also is put into perspective. The lowest the inventory-to-shipments ratio has ever been is 1.76 (in December 1987 and January 1972). At the height of the 1985 debacle, the ratio stood above 2.30. So clearly, now inventories are being kept down.

All this data is telling the industry one thing: Don't worry. 1989 and 1990 are not going to be repeat years of the 1985 disaster. The inventory buildup and the over-booking which plagued manufacturers three years ago are nonexistent today.

Cahners Economics is forecasting a slight slowdown for the U.S. electronic component industry. Shipments from U.S. factories, which are expected to grow 14% this year, will see a 2% to 4% decline next year. This forecast is based on an overall economy-wide slowdown that assumes gross national product (GNP) will grow 3.1 in 1988 and 0.9% in 1989, after adjusting for price changes.

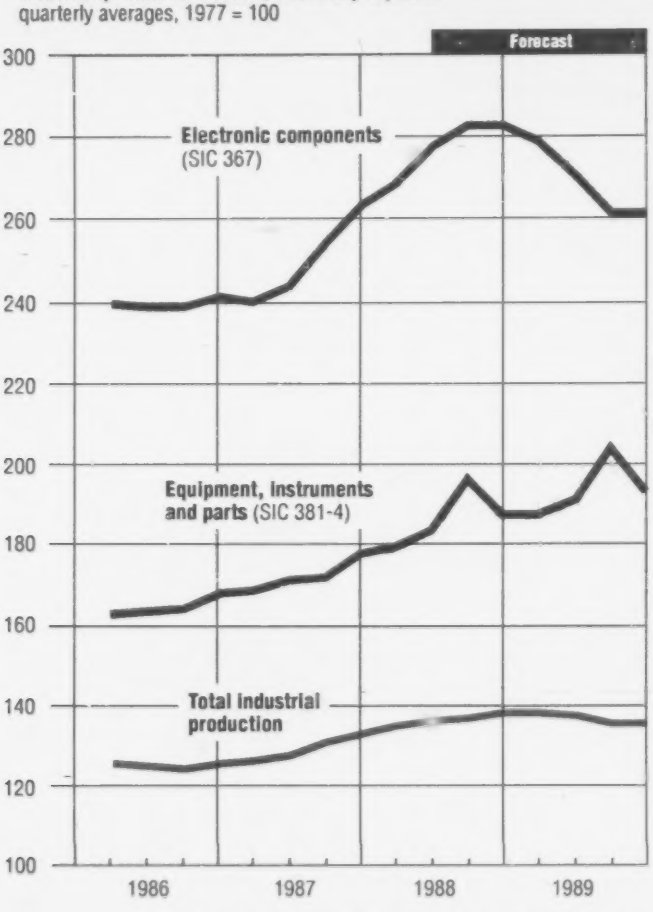
Economic indicators



Historical data: U.S. Federal Reserve Board; Forecast: Cahners Economics

Components and instruments — Industrial production

Industrial production indexes, seasonally adjusted quarterly averages, 1977 = 100



Historical data: U.S. Federal Reserve Board; Forecast: Cahners Economics

U.S. production remains steady

The indicator peaked in the third quarter of 1987 and is heading for a low point in the second quarter of 1989. But the downturn will be mild and short-lived, according the CEWI readings. The growth expected in U.S. industrial production has been revised downward slightly for 1988 by Cahners Economics. So instead of slowly accelerating growth this year, industrial output will hover around the 5.1% to 5.9% range all year before heading down in 1989. The reason for the revision? Inventories of imported goods are high. This could result in greater import price competition and U.S. manufacturers could feel the heat. Still, export growth and renewed business investment will steer U.S. industry to steady growth gains this year, albeit somewhat lower than Cahners' predictions several months ago.

More information can be obtained from Elizabeth Baatz, economist, Cahners Economics Department, 275 Washington St., Newton, Mass. 02158.

Equipment industry: Steady as she goes

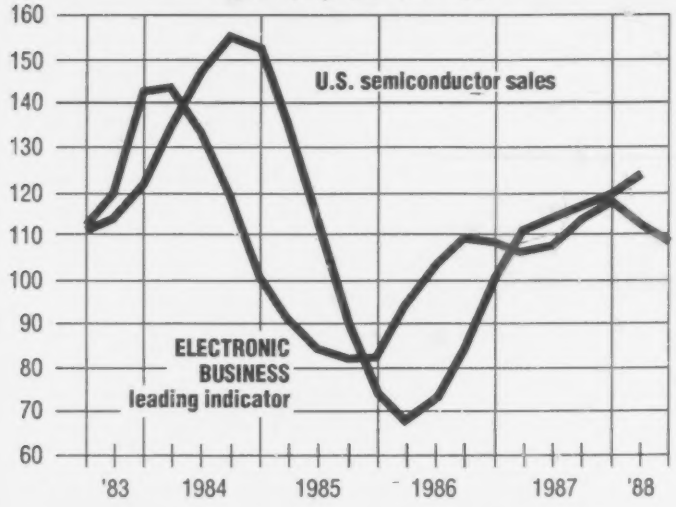
For forecasters, the equipment, instruments and parts industry has been like a dream. Quarter-to-quarter growth in this industry has been consistent, if somewhat unspectacular. Output at U.S. factories rose 0.8% in the first quarter of 1988 and will head up another 2% or so in the next quarter. Overall, Cahners Economics predicts an 8% gain for the entire year, almost twice as fast as last year. The best news for this industry is in 1989 and 1990. While many other electronics industries will be weakening, instruments, aided by the quality-conscious manufacturing sector, will be holding steady.

Components production nears 1984 records

U.S. factory output of electronic components rose 1.7% in the first quarter of 1988 and is estimated to have jumped 3.4% in the second quarter. As a result, production levels are now at their highest since early 1985. An 11% growth is forecast this year, followed by a 3.6% drop in 1989. Despite the 1988 growth outlook, production levels will remain just shy of 1984 records. But by 1990, due to such a mild 1989 downturn, records will be easily and quickly broken. Factory capacity will be at a premium, so equipment investment is not expected to fall much despite some end-market sluggishness.

ELECTRONIC BUSINESS leading indicator

Quarterly (rate-of-change)



The ELECTRONIC BUSINESS leading indicator predicts turning points in U.S. semiconductor sales with about a three- to nine-month leadtime. For more information please contact Elizabeth Baatz, senior economist, Cahners Publishing Co., 275 Washington St., Newton, Mass., 02158, or call (617) 558-4368

Monthly (rate-of-change)

The ELECTRONIC BUSINESS leading indicator fell again in April to 109.5, the fourth consecutive monthly decline. The indicator will most likely continue falling for a few more months, possibly inching up one month occasionally. The overall trend will be a mild ratcheting downward, a pattern that will be typical in most electronics end markets in 1989.

Source: Cahners Economics

Electronics industry indicators this month

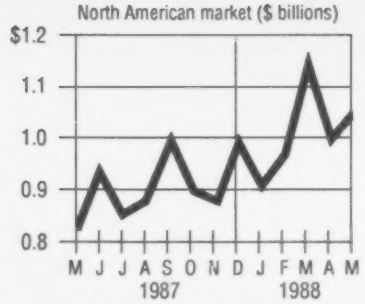
	Latest month	Previous month	Year ago	1987 average
ELECTRONIC BUSINESS leading indicator (rate-of-change, April)	109.5	111.0	107.4	111.8
U.S. semiconductor bookings ($ millions, 3-month average, May)	$1,223	$1,214	$1,025	$951
Weekly hours of semiconductor production workers (monthly average, April)	40.1	40.2	40.3	40.6
Electronic components leadtime index (1977 = 100, June)	120.2	114.3	90.1	100.7
Standard & Poor's semiconductor price index (1970 =10, monthly average, May)	58.2	60.1	69.7	65.5
Change in electronic components inventories ($ millions, SA, April)	+$36	+$33	-$8	+$47
Contract and orders for plant and equipment ($ billions, SA, April)	$36.9	$36.9	$33.3	$34.4

SA = seasonally adjusted, all other data is not seasonally adjusted

Sources: Semiconductor Industry Association, U.S. Bureau of Labor Statistics, *Electronics Purchasing* magazine, Standard & Poor's, U.S. Commerce Department, U.S. Bureau of Economic Analysis

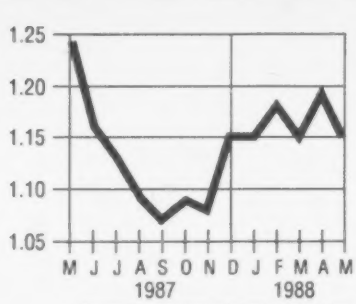
Semiconductor sales

North American market ($ billions)



Source: Semiconductor Industry Association

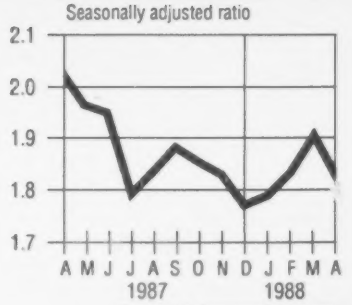
Semiconductor book-to-bill ratio



Source: Semiconductor Industry Association

Component inventory-to-shipments

Seasonally adjusted ratio



Source: U.S. Commerce Department